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AUTHOR Larson, Elston F.
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ABSTRACT

The purpose of this booklet is to help teachers, scoutmasters, and other group leaders give elementary map and compass instructions in a manner that is both simple and fun. It is intended to be a guide for a training course on this subject. Much of the text is taken directly from an actual training course and is written in the manner of a teacher talking to his students. The teacher, therefore, can give a part of his presentation by reading directly from this guide. Necessary materials and a setup of the instruction area are given. The instructor's presentation includes: The Map; The Compass; Directions; Orienting a Compass; Measurement; Competitive Compass Game; Combining Use of Map, Compass and Measurements; Method of Getting the Compass Degree Reading from the Map; and Practice Course Using Map and Compass. (FF/KM)

ELEMENTARY MAP and COMPASS INSTRUCTION

An outline for a training course in the use of maps and compasses

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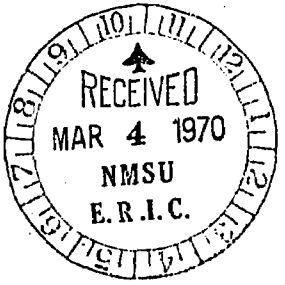


by Elston Larson
Silva, Inc.
La Porte, Indiana

ELEMENTARY MAP AND COMPASS INSTRUCTION

INTRODUCTION

The purpose of this booklet is to help teachers, scoutmasters, and other group leaders to give elementary map and compass instructions in a manner that is both simple and fun. It is intended to be a guide for a training course on this subject. Much of the text is taken directly from an actual training course and, therefore, is written in the manner of a teacher talking to his students. The teacher, therefore, can give a part of his presentation by reading directly from this booklet if he so desires.

LIST OF MATERIAL NEEDED

1 Needle type compass

1 Floating Disc type compass

1 Silva Compass (plus one for each student)

1 Magnetic Compass needle

1 Common Pin

Samples of maps, including at least one topographic map, one aerial photo map, road map, sketch maps of any area such as camps plus any others of special interest

1 Practice Map as per Figure 2, plus one for each student

1 Set of Compass Game Cards described on page 3 (one set needed for each 20 players)

Pencils (one for each person)

1 Sign, about 8" x 12" reading "200 ft. Step Course Begins Here".

1 Sign, about 8" x 12" reading "200 ft. Step Course Ends Here. Return to Start".

40 Stakes about 1 ft. long

40 3" x 5" Cards

Thumb tacks

1 Potato, medium size (see Page 4)

1 Knife to slice potato

1 Axe (to drive stakes)

1 Brush pen (to make signs, markers, etc.)

1 100' tape measure

SETUP OF THE GAME, PRACTICE AND INSTRUCTION AREA

Since the method of instruction described in this booklet is by means of an outdoor training course and requires participation by the students, the area should be prepared in advance. Minimum space required is 100′ x 100′, usually open and free of obstacles, such as a baseball diamond or a football field. However, a few trees or bushes will not hurt and can even add interest, especially for adult groups.

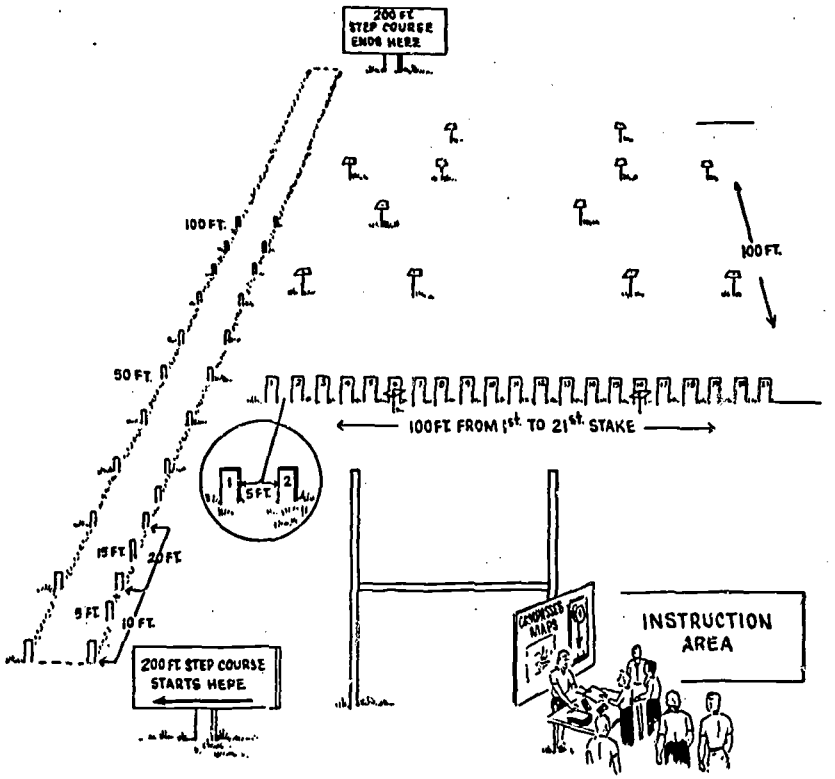


Fig. 1. Layout for Area

The layout of the area is shown in Figure No. 1. Basically it consists of three parts, namely, the Compass Game, the Step Course and the Map and Compass Area. The set-up for the Compass Game is simply a row of markers five feet apart on a straight East-West line. The markers are numbered consecutively from 1 to 21, with number 1 on the West end.

The Map and Compass Area consists of stakes set out in the area and located so they correspond to the dots on the Practice Map (Figure No. 2). The stakes can be about 6" high with 3" x 5" cards fastened on top. The top part of each card is lettered to correspond with the practice map, such as "This is Location A", or "This is Location L", etc.

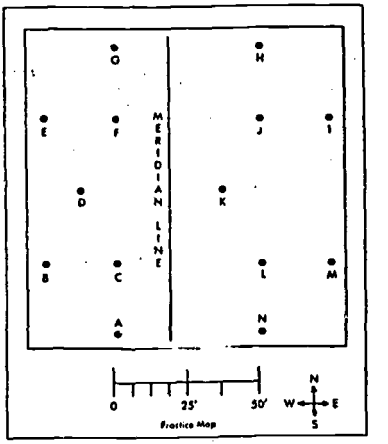
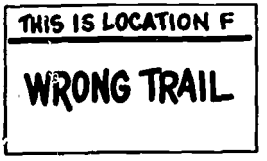


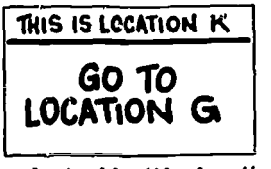
Fig. 2 Practice Map

Although the Map and Compass Area is not a part of the Compass Game, they can both be located on the same 100' x 100' area. In fact, it is helpful to use the Compass Game markers as guides for locating the various stakes of the Map and Compass Area. For example, Location B should be 25' straight north from Compass Game marker No. 1 and Location E should be 75' north of No. 1.

Location A is exactly at Compass Game No. 6 whereas Location C is 25' north of No. 6. Similarly, Location N coincides with No. 16 and Location J is 75' north of No. 16, etc. Therefore, by using a 100' tape measure and a compass, it is an easy matter to locate the proper locations by measuring straight north from appropriate numbers of the Compass Game.

When all of the markers have been set out accurately, the Practice Map then is actually a real map of the area. Choose a "trail" to be followed, which, for example, might begin at Location A, then go to B, then to J, then to M, then to K and finally end at G. On the bottom of each card along the "trail" write instructions where to go next, such as "Go to Location K". The card at the final destination should read "This is Location G. Congratulations! You have reached your destination. Report to leader". On all other cards write "Wrong Trail".





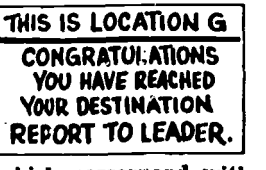


Fig. 3. Typical 3" x 5" cards to identify locations which correspond with the Practice Map.

Notice that the locations on the Practice Map have a geometrical pattern to simplify laying out the corresponding markers on the area. To break up this pattern set out about three additional markers at random and mark each "Wrong Trail". Be sure these are not located on the "trail" you laid out.

The STEP COURSE is simply two stakes measured 200' apart. To add interest, signs can be attached reading "200' Step Course Begins Here" and "200' Step Course Ends Here. Return to Start".

THE INSTRUCTION AREA

The instruction area can be either indoors or outside. Since this is a "try and do" type of training, lecturing should be kept to a minimum. Nevertheless a certain amount of explanation is necessary. This portion of the training course can be entirely informal, but will be more interesting and impressive if a few props are used. A table in front of the speaker can accommodate a display of various compasses as well as whatever literature might be available. Exhibit various examples of maps and sketches on a wall or on trees or posts behind the speaker. Try to include a photomap and at least one topographic map.

INSTRUCTOR'S PRESENTATION

The italicized portions of the following pages were taken almost literally from an actual training session. While there are many good ways to present any subject, these words are printed as one suggested presentation.

Before beginning the presentation, it is helpful and good procedure if a person of authority will bring the group to order and introduce the instructor. This is effective even if the instructor is no stranger. After proper response by the instructor, the course should begin at once.

THE MAP

The procedure for this training session is divided into five parts. They include (1) *The Map,* (2) *The Compass,* (3) *Measuring Distances,* (4) *A Compass Game using both the compass and measurements, and* (5) *Combining the use of compass, measurements and map.*

PHOTOMAPS

Our first consideration will be the map. Everyone knows what a map is, and yet, a simple definition may make map study easier.

A map is a picture of the terrain viewed from above. In fact, if we photograph the ground from an airplane, we get a photomap just like this. (Show a photomap).. *But photographs do not always show every thing we want to know. For example, hills are not clearly visible. Roads and streams sometimes disappear beneath trees, and reappear going in a different direction. On the other*

hand they may show too much detail that they become confusing to read. Consequently drawn maps are often better!

DRAWN MAPS

A drawn map still is a picture viewed from above. Keep that in mind. It may emphasize the things we want to show most and omit unimportant details. For example, road maps ordinarily show roads, towns and cities, but not houses, woods and marshes. Other maps, such as this topographical map (show a topographical map) *may emphasize the countryside itself. Or a very simple map like this one* (show sketch) *may be sufficient to show the limits of this camp as you enter from the road.*

MAP SYMBOLS

In drawing a map, we could, and sometimes do, draw actual pictures to show the various details of the map. But because pictures use much space, are sometimes hard to draw and for other reasons, most maps use symbols to designate buildings, streams, roads and other details. These symbols have become standardized and now almost everyone drawing maps use the same set of symbols. Most of them are very suggestive of the objects they represent, for example, a house is a black rectangular or square marking; a school is the same but has a flag on it; a church has a cross; railroads have ties; power lines have dots like poles; and so on. A contour line is a line drawn to represent a given altitude, say 1,000 *feet above sea level; because this line is representing a given height, it would wind around and eventually connect itself as it gets around the hill. Your map will tell the difference in altitude between the various contour lines so contour lines of the map will reveal not only the height of a hill but also its shape. Where contour lines are close together the hill is steep; where they are far apart the land is more level.*

CONTOUR LINES

Of all the map symbols, the contour line seems to be the most difficult to comprehend. However, with this potato you can easily get the idea. We cut the potato in half and give one half back to the cook. (Cut potato in half, and throw one half away). *We will now slice up this other half into ¼" slices.* (See illustration on next page). *There it is. Now we will reassemble the slices and place the reassembled half potato on the table.* (Perform the slicing and reassembling as you talk.) *You can see all the slice marks are the same distance apart. Yet if you look from above, the slices appear very close on this steep side of the potato, but are farther apart here where the side is not so steep.* (Illustrate by looking straight down on the potato and by pointing to the sides as you talk.) *If this potato were a hill, these slice marks viewed from above appear exactly the way contour lines would appear on a map.*

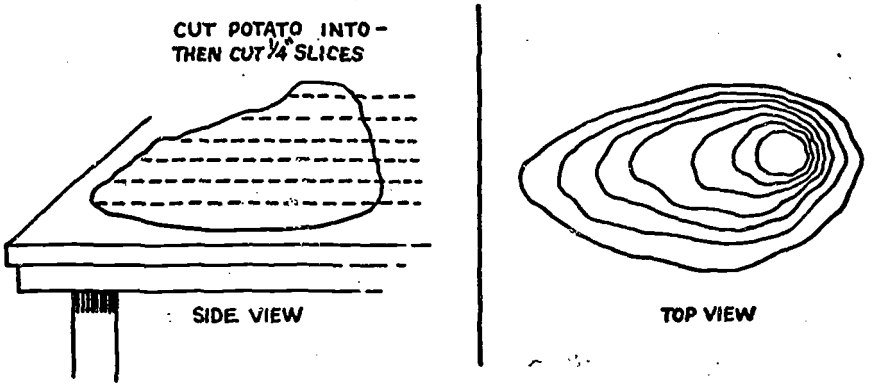


Fig. 4. To illustrate contour lines, slice potato into even slices, reassemble the slices and view slice marks from above.

MAP SCALE

Another important part of the map is the Map Scale. It is the device to tell "How Far". A map scale is sort of a ruler located on the map or its border. It is usually divided into segments and at the end of each segment a certain distance will be written, for example, 25 *feet or* 1,000 *yards or* 1 *mile. If, for example, the distance of* 1 *mile is written at the end of the segment, that means that the length of that segment on the map represents* 1 *mile on the ground.*

THE COMPASS

HISTORY

No one knows who first discovered the compass. The first compass, no doubt, was simply a rock or stone containing magnetized ore commonly known as lode-stone which, when suspended on a thong or vine, would always point in the same direction. The Chinese used compasses as far back as 300 A. D. According to some authorities Marco Polo, in the year 1260, *transplanted into Europe a knowledge of compasses he had gained in Cathay.*

PRINCIPLE

Essentially all compasses are alike in that a magnetized object is freely suspended so that the earth's magnetism will cause the object to point to the magnetic North Pole. (Demonstrate with compass needle and pin). *The earliest compasses were crude and the magnetized object was simply an ore bearing rock. As time went on refinements increased its accuracy and dependability.*

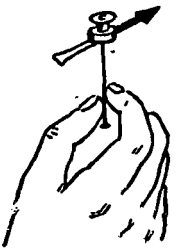


Fig. 5. Magnetized needle points to Magnetic North Pole.

DIRECTIONS

In order to make it easier to find one's way, directions were called by names as "North", "East", "South", and "West". If we freely suspended a magnetized object, one end will point north. If we draw a circle around the suspended object and place a mark on the circumference at the point where the suspended object is pointing, we have a certain refinement to the compass. This point can be designated with the letter N for north. E, S, and W can be added to make the four quarters of the compass. Divide these quarters and appropriately designate the divisions marked with NE, SE, SW, and NW. Each of these markings is known as a "point of the compass" and we usually think of the compass as having 32 points.

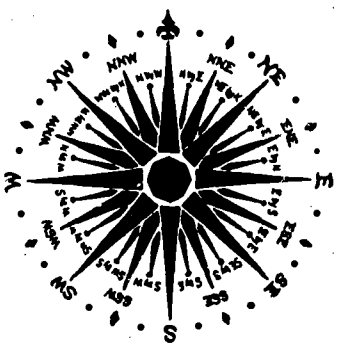


Fig. 6. 32 points of a compass.

Normally, a circle is divided into 360 parts instead of just 32 and each division is known as a degree. For greater accuracy, degrees are often used instead of the old system of compass points. For instance, 0 degrees is North, 90 degrees is East, 180 degrees is South and 270 degrees is West. North may also be designated by 360 degrees.

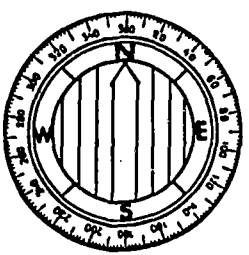


Fig. 7. 360 degrees of a compass.

ORIENTING A COMPASS

To orient a compass you turn it until the north end of the needle points to the letter N on your compass. (Demonstrate with ordinary needle type compass. Also with a Silva type.)

HOW TO USE A COMPASS

To use an ordinary needle type compass, it first should be oriented. Then if you want to go 70 degrees, sight from the center point of your compass needle across the 70 degree marking, and your objective will be in the direction thus sighted. (Demonstrate the needle type compass). *A floating dial type compass is used in the same manner except that the compass need not be oriented.* (Demonstrate with floating dial type compass.) *With the Silva type compass, set the dial to 70 degrees, then orient the compass. The arrow on the plastic base points to your objective.*

Now let's suppose that an airplane crashed in a nearby woods and your group was asked to rush there to help out. In the woods there

are no street signs, no road markers to show the way so the leader simply says that the wreckage is 40 degrees, 1,000 feet from the entrance to Jones Woods. When we arrive at the entrance, we can quickly go there if we know how to use our compass. Here is how: (Explain slowly and carefully and by individual steps.)

Notice several parts of the compass. The "Direction of Travel" arrow is on the plastic base. This is the arrow that shows which way to walk after our compass is set. (Point out the arrow.)

This is the housing. It turns—try it. (Demonstrate.)

The numbers around outside of the housing are degrees. Whichever degree number is at the "Direction of Travel" arrow is the degree setting of the compass. Inside of the housing is an arrow-shaped needle which swings on a pin. It is the "Magnetic Needle." It always points north and, therefore, is not the way to go. The "Direction of Travel" arrow points the way to go.

Now let's determine which way is 40 degrees—the way we want to go. First, turn the housing until the figure "40" is at the "Direction of Travel" arrow. Now the compass is set—do not turn the housing any more.

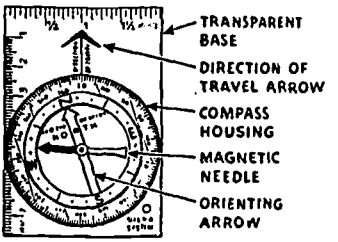


Fig. 8. A Silva Compass.

Second, hold the compass level, about waist high—or a little higher—and be sure the "Direction of Travel" arrow points straight ahead of you—not toward you nor to one side. If you hold the compass with both hands and keep your elbows tight against your sides, you can hold it steadier.

Third, rotate your body and watch your compass. Keep turning until the red end of the magnetic needle points to the letter "N" on top of the housing. As you turn, do not twist the compass in any way. Keep the "Direction of Travel" arrow pointed straight ahead of you at all times. When you have turned far enough so that the red end of the needle points to "N", (magnetic needle will coincide with orienting arrow and compass is said to be "oriented") *then you are facing the correct direction to walk.*

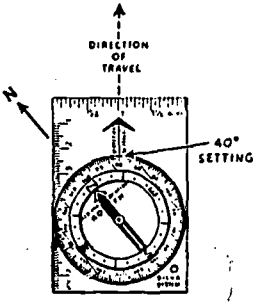


Fig. 9. With dial "set" and compass "oriented", the arrow points the way to go.

Look up and sight an object such as a tree or bush in that direc-

tion. Then forget the compass and walk to that object. When you arrive there, repeat the process and pick out a new objective. Repeat until you reach your destination. (Demonstrate and repeat until each person can set the compass to a degree reading and determine his direction of travel.)

MEASUREMENT

TIMING

The compass will tell us the correct direction to travel but it is also necessary to know how far to travel when we want to find our way. Seldom is it practical to use a tape measure so other means must be learned in order to be practical. One method often used is by timing your walk. If you normally walk 4 miles per hour, and your destination is two miles away, you will reach it in a half hour of normal walking speed. But in woods or other places where walking speed is retarded, you must estimate whether your speed is retarded and how much. If, for example, you think you are walking about ½ normal speed, you will allow yourself about one hour to reach the destination two miles away. Your speed will depend upon the terrain. If walking is difficult your speed will be slow. If you have a nice path to follow, your speed will approach normal.

JUDGING

Another method is by estimation or judging of actual distances. Use several distances with which you are acquainted and apply them to unfamiliar places. For example, if you recall that your childhood home was ¼ mile from the main road, you probably have a very good idea how far away ¼ mile would be. Then use it as a mental measuring stick when judging distances. Almost everyone knows how far it looks along the length of a football field. It is 100 yards and you can also use that as a mental measuring stick. The presence of many objects such as in wooded areas, or the lack of objects such as in the great plains region, will distort your conception of distances. It is, therefore, advisable to practice the estimation of distances under as many varieties of conditions as possible.

STEPPING

For shorter distances, stepping is ideal and can be very accurate with but little practice. Everyone should learn how to measure by stepping and that is the means we will use today. Usually it is well to learn the "feel" or the "stretch" of a specific length step such as 2 feet, 2½ feet or 3 feet. 2½ feet is an average step for most people, two steps equaling 5 feet. That makes measurement easy because all you need do is count by fives to determine your distance. Start by placing your left foot at the starting place and each time you place your left foot count by fives until you reach your destination.

PRACTICE OVER MEASURED STEP COURSE

So that you may practice to measure distances by stepping, we have a 200' step course, measured with a tape measure. (Advise the location of the step course.) *For most people a 2½' step length is ideal because two steps then equals 5' and it is so easy to count by fives. Proceed now to the step course and walk from one end to the other at a normal speed and count every second step by fives. If your count is* 200 *when you reach the end of the step course you may consider your step length to be 2½ feet. Otherwise, adjust your steplength slightly on your return trip and repeat until you get the "feel" of this steplength.*

JUDGING ACROSS STREAM

Demonstrate and explain by holding your hand over your eyes like a sunshade while you are standing on one bank of a stream—real or imaginary. Raise or lower your hand so that your line of vision at the bottom of your hand sights at the opposite bank of the stream. Then while holding your hand steady in same position, turn at right angles and note the spot on the ground where your line of vision strikes; step off

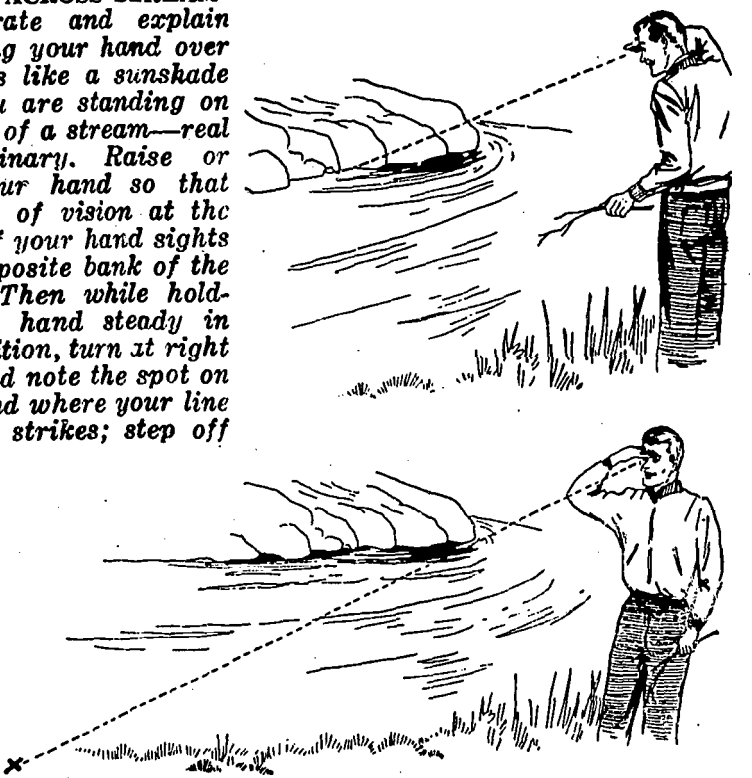


Fig. 10. Estimating distance across stream.

that distance. This gives you the approximate distance across the stream.

JUDGING HEIGHT

(Demonstrate and explain by using pencil.) *Go up to a tall tree and by using your own height as a gauge, place a mark at 6 feet*

from the ground. Walk away some distance and hold a pencil upright at arms length so that its top is exactly on your line of sight to the 6 foot marking on the tree. Then adjust your thumb and fingers on the pencil, so that they are exactly at your line of sight to the bottom of the tree. The portion of the pencil between your fingers and the pencil top will now cover 6 feet of the tree. By moving pencil upwards you can count the number of six foot spans to the top and closely estimate the height.

COMPETITIVE COMPASS GAME, BSA CATALOG NO. 1133.

The Competitive Compass Game consists of twenty different score cards and one answer card. Provide each player with a score card and then explain the game thoroughly.

The row of numbered stakes shown in Figure No. 1 is for the Compass Game. Each number is the starting place of a 3-legged compass course and each course is different. Each course ends at a different number than the start—never at its starting number. Instructions on the score cards tell the players where they should go. The answer card tells whether he has gone correctly. If the player arrives at the correct destination, his score is 100. Otherwise deduct 5 points for each marker missed from the correct one. For example, if player on Course No. 4 finishes at (or nearest to) No. 11, he missed the correct destination (No. 8) by three markers and his score is 85.

Each score card includes directions for three courses. Players should complete all three courses and add the three scores to obtain his Total Score. Highest Total Score is the winner. Highest possible total score is 300.

Scores may be kept individually, or team scores may be obtained by totaling the individual scores and dividing by the number of players on the team.

The above game is excellent not only for training, but also for just plain fun for use on playgrounds and at camp. The Competitive Compass Game is available from Silva, Inc., La Porte, Indiana 46350, for 25 cents per package. It is also available from the Boy Scouts of America, their Catalog No. 1133. A "backyard" version for smaller areas is also available from Silva, Inc.

COMBINING USE OF MAP, COMPASS AND MEASUREMENTS

In the preceding instructions and game you were advised which bearings and distances to use. However, when we are in the wilderness there is seldom anyone to tell us to go 70 degrees, or 110 degrees. We must somehow determine that ourselves. That can be done by combining the use of map and compass.

ORIENTING THE MAP

When using a map, you may find it easier to understand the relationship between ground and map if you have it "oriented",

because the directions are then the same. Orienting a map simply means turning the map so that the northerly direction of the map coincides with the northerly direction of the terrain. There are two ways to orient a map, by inspection and by compass.

"BY INSPECTION" simply means to look at the terrain with the map directly ahead of you. This can be done when you recognize on the map some objects that you see on the ground. Then turn your map until the roads or other recognizable objects on the map line up with those same objects on the terrain.

"BY COMPASS" is usually a much easier and more reliable method, especially if you haven't yet identified on the map the objects you see on the ground. The top of your map points in the general direction of north. Your map should show a north-south line in the margin or on the map itself. Lay your compass on or near this line and then turn your map and compass together until the compass needle is parallel with the N-S line of your map, and the north end of the needle points towards the top of the map. (Provide each person with a Practice Map as illustrated in Figure No. 2. Demonstrate, using Practice Map and permit each person to do likewise.) *With a Silva Compass it is not necessary to orient the map to take a compass bearing, but as I said before, it is easier to compare the map with the terrain if the map is oriented.*

METHOD OF GETTING THE COMPASS DEGREE READING FROM THE MAP

Now let's determine how to get a degree reading, also called compass bearing, from a map. Using your Practice Map, let us suppose that we are now located at Location C and we want to go to Location K. There are two easy steps needed to find the correct degree reading. First, lay your compass so that the edge of the transparent base is along the line of travel. It should intersect the Location C and Location K. In doing so, there is one thing to remember: be sure the "Direction of Travel" arrow is pointing in the direction of travel, like this (demonstrate), *not like this* (demonstrate the incorrect way, then repeat the correct way.) *This is Step No. 1. In the second step, hold the compass firmly against the map* (as described in

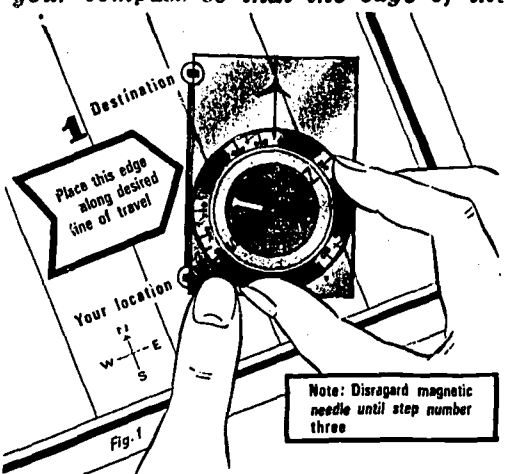


Fig. 11. Step ONE

Step No. 1) *so the transparent plate will not move from the line of travel. Then turn the housing so that the orienting arrow* (underneath the needle inside the housing) *points to the top—North—of the map. Notice especially that in Step No.* 1 *and No.* 2 *we do not pay any attention to the magnetic needle itself. The orienting arrow underneath the needle is the one we are concerned with and is the one that should point to the top—North—of the map. That completes Step No.* 2. *Remove your compass from the map and tell me the degree reading of your compass.* (At this point, it may be necessary to repeat. Let each person take two or three bearings from the map, from and to different points which you specify, until each person is able to give you the correct degree reading.)

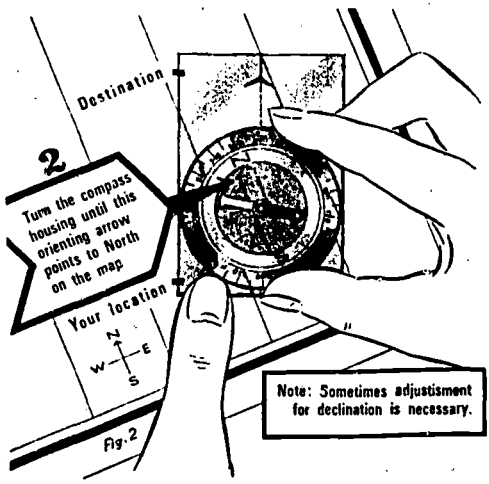


Fig. 12. Step TWO

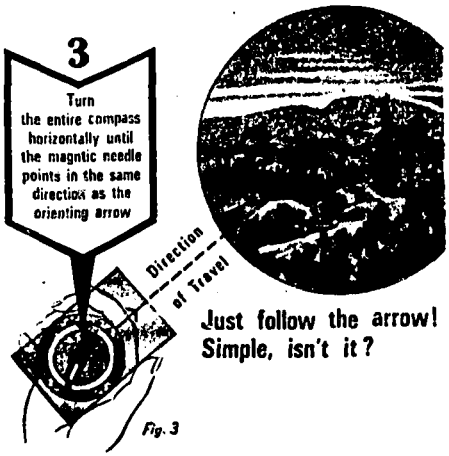


Fig. 13. Remove compass from map, orient the compass and follow the arrow.

ADJUST FOR DECLINATION

We have now learned how to take a bearing from a map. However, a slight readjustment of the degree reading must be made in most areas if we wish to be perfectly accurate. This is because the compass needle does not necessarily point to the true North Pole. It points to the Magnetic North Pole which is located in the Hudson Bay region. The difference between true North and Magnetic North is called "Magnetic Declination" sometimes called "Magnetic

Variation", and the amount of this difference is shown in Figure No. 14. If you happen to be on the zero line there would be no declination. If you are located East of this line the compass needle points west of true north and is called "Westerly Declination."

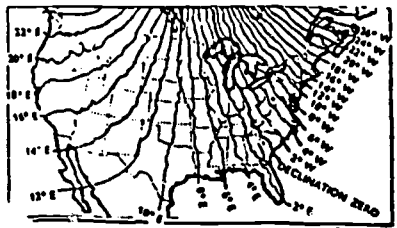


Fig. 14. Declination chart. East of the zero line, declination is "westerly." West of the zero line, declination is "easterly."

If you are located west of the line, you have an "Easterly Declination."

When adjusting the compass for easterly declination, note the degree reading of your compass, then subtract from that reading the amount of declination and reset your compass housing accordingly. For example, if your degree reading is 70, and and the easterly declination is 10 degrees, you reset your compass to 60 degrees. If you have a westerly declination you add the amount to the degree reading of your compass. For example, if your compass setting is 70 degrees and you have a 10 degree westerly declination, you reset your compass to 80 degrees.

PRACTICE COURSE USING MAP AND COMPASS

The practice area as shown in Figure No. 1 contains stakes marked with letters to correspond with the Practice Map shown in Figure No. 2. The Practice Map, therefore, is actually a map of the practice area and compass bearings can be taken from it in the same way that compass bearings can be taken from the topographic maps.

As mentioned on page 3 a "trail" was laid out and designated on the marker cards. Lead 4 or 5 of the students to the start of the "trail" and explain they should use their compass to find their way. For example, if the card at Location A reads "Go to Location B", the student will use his map to "take a bearing" from A to B and also scale the distance. If the bearing is 315° and the distance is 35' he will use his compass to walk in that direction, stepping off the distance as he walks. If he went in the correct direction (315°) for the proper distance (35'), he will arrive at Location B and the card there will designate the next station. He will thus continue from station to station to the end of the trail.

After the first 4 or 5 students are well along the trail, lead 4 or 5 more to the starting place. Although several can start at a time, each student is "on his own" and need not wait for others as he proceeds along the "trail". When he reaches the end and reports to the leader, he can be told where to wait until the others have finished. At that time a question and answer period can be used to close the training course.